December 2, 2004

Mr. Gregory M. Rueger
Senior Vice President, Generation and
Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Power Plant
P. O. Box 3
Avila Beach, CA 93424

SUBJECT: DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2 - ISSUANCE OF AMENDMENT RE: REVISED TECHNICAL SPECIFICATIONS 3.3.1, "REACTOR TRIP SYSTEM (RTS) INSTRUMENTATION" AND 3.3.2, "ENGINEERED SAFETY FEATURE ACTUATION SYSTEM (ESFAS) INSTRUMENTATION" (TAC NOS. MC0893 AND MC0894)

Dear Mr. Rueger:

The Commission has issued the enclosed Amendment No. 178 to Facility Operating License No. DPR-80 and Amendment No. 180 to Facility Operating License No. DPR-82 for the Diablo Canyon Power Plant, Unit Nos. 1 and 2, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated September 12, 2003, and its supplements dated April 23, June 4, and August 30, 2004.

The amendments increase the current steam generator narrow range water level-low low setpoints from greater or equal to 7.0 percent allowable value and 7.2 percent nominal trip setpoint to greater than or equal to 14.8 percent allowable value and 15.0 percent nominal trip setpoint. The reactor trip setpoint is specified in TS Table 3.3.1-1, "Reactor Trip System Instrumentation," and the actuation setpoint to start the auxiliary feedwater pumps is specified in TS Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation."

A copy of the related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's next regular biweekly *Federal Register* notice.

Sincerely,
/RA/

Girija S. Shukla, Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosures:
1. Amendment No. 178 to DPR-80
2. Amendment No. 180 to DPR-82
3. Safety Evaluation

cc w/encls: See next page

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***SE Dated**

Package No.: ML043090247 **Tech Specs.: ML043380317** **Nrr-100**
ACCESSION NO.: ML043090237 NRR-058 **NLO w/comment**

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PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-275

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 178
License No. DPR-80

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Pacific Gas and Electric Company (the licensee) dated September 12, 2003, and its supplements dated April 23, June 4, and August 30, 2004, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (I) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-80 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 178, are hereby incorporated in the license. Pacific Gas and Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION
/RA/

Robert A. Gramm, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: December 2, 2004

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-323

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 180
License No. DPR-82

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Pacific Gas and Electric Company (the licensee) dated September 12, 2003, and its supplements dated April 23, June 4, and August 30, 2004, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (I) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-82 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 180, are hereby incorporated in the license. Pacific Gas and Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Gramm, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: December 2, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 178

TO FACILITY OPERATING LICENSE NO. DPR-80

AND AMENDMENT NO. 180 TO FACILITY OPERATING LICENSE NO. DPR-82

DOCKET NOS. 50-275 AND 50-323

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment numbers and contain marginal lines indicating the areas of change.

REMOVE	INSERT
3.3-14	3.3-14
3.3-31	3.3-31

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 178 TO FACILITY OPERATING LICENSE NO. DPR-80

AND AMENDMENT NO. 180 TO FACILITY OPERATING LICENSE NO. DPR-82

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By application dated September 12, 2003 (ADAMS Accession No. ML032680790*), and its supplements dated April 23 (ADAMS Accession No. ML041250388*), June 4 (ADAMS Accession No. ML041610405*), and August 30, 2004 (ADAMS Accession No. ML042570252*), Pacific Gas and Electric Company (PG&E or licensee) requested changes to the Technical Specifications (TSs) (Appendix A to Facility Operating License Nos. DPR-80 and DPR-82) for the Diablo Canyon Power Plant (DCPP), Units 1 and 2.

The proposed TS changes would increase the current steam generator (SG) narrow range (NR) water level-low low setpoints from greater or equal to 7.0 percent allowable value and 7.2 percent nominal trip setpoint (NTS) to greater than or equal to 14.8 percent allowable value and 15.0 percent NTS. The reactor trip setpoint is specified in TS Table 3.3.1-1, "Reactor Trip System Instrumentation," and the actuation setpoint to start the auxiliary feedwater pumps is specified in TS Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation."

The SG NR water level-low low setpoints specified in TS Tables 3.3.1-1 and 3.3.2-1 were originally set at 15 percent NTS. In 1989, the licensee reduced the setpoint to 7.2 percent NTS in License Amendment No. 34 for Unit 1 and No. 33 for Unit 2. The setpoint was reduced to decrease the number of unnecessary reactor trips. The NRC previously approved the setpoint reduction on the basis of replacement of the Barton 764 SG level transmitters with more accurate Rosemount 1154 transmitters and on the use of an improved setpoint calculation methodology documented in WCAP-11784, "Calculation of Steam Generator Level Low and Low-Low Setpoint With Use of a Rosemount 1154 Transmitter." The effect of the mid-deck plate was not factored into the setpoint at that time.

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*Public accession to ADAMS has been temporarily suspended so that security reviews of publicly available documents may be performed and potentially sensitive information removed. Please check the NRC Website for updates on the resumption of ADAMS access.

The licensee proposed to raise the SG NR water level-low low setpoint back to 15 percent span to correct non-conservative setpoints reported in License Event Report (LER) 1-2002-001-00, "Technical Specification Violation Due To Nonconservative Steam Generator Narrow Range Water Level Instrumentation," submitted by the licensee in a letter of April 15, 2002.

The licensee installed digital feedwater control systems (DFWCS) in both units, which significantly improved SG water level control capability, particularly at low power levels. In addition, the replacement of the Westinghouse 7100 process protection system with Eagle 21 digital process protection equipment included a trip time delay functional upgrade to reduce unneeded SG water level-low low reactor trips below 50 percent power. The improved SG water level control provided by the DFWCS, the trip time delay provided by Eagle 21, and operational improvements, such as deferring paralleling the main generator during startups until about 12 percent power in conjunction with use of the steam dumps, essentially eliminated reactor trips due to SG low level transients. With these improvements, raising the SG NR water level-low low setpoint back to 15 percent is not expected to result in an increase in reactor trips due to SG low level transients.

In support of its proposed TS changes, the licensee provided the results of its technical evaluation and responses to the staff's requests for additional information (RAI) for review.

The April 23, June 4, and August 30, 2004, supplemental letters provided additional clarifying information, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 25, 2003 (68 FR 66138).

2.0 REGULATORY EVALUATION

In accordance with General Design Criterion (GDC) 20, "Protection System Functions," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR Part 50, the specified acceptable fuel design limits (SAFDLs) must not be exceeded during normal operation and anticipated operational occurrences (AOOs).

Also, the NRC issued Information Notice (IN) 2002-10, "Nonconservative Water Level Setpoints on Steam Generators," on March 7, 2002, to alert holders of operating licenses to the potential for non-conservative setpoints of the SG water level. The IN was issued as a result of a February 9, 2002 occurrence at DCPP Unit 2, where the SG NR water level instrumentation did not respond as expected to initiate an automatic reactor trip and AFW actuation on the SG water level-low low signal during a plant trip. This event prompted Westinghouse, the SG manufacturer, to issue various Nuclear Safety Advisory Letters (NSALs).

As discussed in NSAL-02-3 and its revision, Westinghouse attributed the water level uncertainties mainly to a differential pressure (ΔP), previously unaccounted for, created by steam flow past the mid-deck plate in the moisture separator section of the SG. Westinghouse-designed SGs incorporate a mid-deck plate at the top of the primary separator assembly between the upper and lower taps used for the SG NR water level instruments. The installation of the mid-deck plate is to reduce moisture carryover. When some of the steam flows through the separator downcomer instead of the primary separator orifice, this steam with some entrained moisture will flow upwards through the flow area in the mid-deck plate, creating a pressure differential. The mid-deck plate ΔP, which is a function of steam flow, causes the SG NR instrumentation to read higher than the actual water level, and adversely affects the SG level-low low trip with an uncertainty bias in the non-conservative direction. Therefore, the SG water level instrumentation without accounting for this ΔP phenomenon could be non-conservative during certain transients.

NSAL-02-4 deals with uncertainties in the measurement created because the void content of the two phase mixture above the mid-deck plate is not reflected in the calculation. The uncertainties may result in a premature actuation of the SG water level-high high trip signal that isolates the feedwater system.

NSAL-02-5 deals with potential inaccuracies in the initial water level assumed in the safety analyses affected by SG water level uncertainties. The safety analyses may not be bounding because under some conditions the velocity head may increase the uncertainties in the SG water level control system.

NSAL-03-09 indicates that Westinghouse has developed a program for the Westinghouse Owners Group that evaluates the effects on the SG water level control system uncertainties from various items. These items include the mid-deck plate, feedwater ring and feedwater ring supports, lower-deck plate supports, non-recoverable losses due to carryunder, decrease in subcooling due to carryunder, as well as transient conditions due to events such as the loss of normal feedwater or a steamline break outside containment. Under this program, Westinghouse evaluated the design features of Westinghouse-designed SGs and other phenomena associated with Westinghouse SGs as they affect uncertainties in terms of the SG water level control system and the SG water level-low low and level-high high reactor trip functions.

In response to the trip event reported in LER 1-2002-001-00 and the issuance of the NSALs by Westinghouse, the licensee evaluated the DCPP water level setpoints with associated uncertainties. As a result, the licensee proposed to increase the SG NR water level-low low setpoints for reactor trip specified in TS Table 3.3.1-1 as Function 14.a, and for AFW actuation specified in TA Table 3.3.2-1 as Function 6.d.1. The staff evaluated the licensee's proposed TS changes in accordance with the GDC 20 requirements and verified that the licensee appropriately addressed the issues discussed in the IN and NSALs.

3.0 TECHNICAL EVALUATION

Three SG NR level channels are installed per SG as part of the reactor protection system. Two out of three SG channels are required to trip the reactor and start the AFW pumps in the event of a loss of normal feedwater or a steam or feedwater line break at power. The proposed TSs would change the setpoints of the SG NR water level-low low trip and AFW actuation from a greater than or equal to 7.0 percent allowable value and a 7.2 percent NTS, to a greater than or equal to 14.8 percent allowable value and a 15 percent NTS, respectively. The changes to a higher trip setpoint and a higher allowance value are conservative relative to the current TSs. However, the changes are necessary for the correction of a non-conservative bias due to various factors (including SG mid-deck plate ΔP) previously unaccounted for.

The licensee provided the calculations of the SG water level-low low setpoints and allowable values for DCPP Units 1 and 2, including the associated uncertainties. The calculation of setpoint uncertainties is comprised of process effects and instrumentation loop uncertainty. The allowance for process effects accounts for non-instrument related effects such as process pressure variation and mid-deck plate pressure loss. These process effects are treated as biases and are combined algebraically. Instrumentation loop uncertainties address the accuracies of instruments, such as transmitter and rack, which are independent and random accuracies. The instrumentation loop uncertainties are statistically combined using the square-root-of-the-sum-of squares technique.

As indicated in the NSALs, the SG level setpoint uncertainties may be caused by several measurement process accuracy (PMA) terms that were previously unaccounted for. The PMA items are mid-deck plate ΔP, intermediate deck plate ΔP, feedring ΔP, lower deck plate and supports ΔP, downcomer subcooling, fluid velocity effects, process pressure variation, reference leg temperature carryunder, void fraction above the mid-deck plate, and the effects of steam carryunder. The licensee considered the PMA terms in its setpoint uncertainty calculations for the DCPP, and provided the results of calculations in Tables 3-11 and 3-18 of WCAP-11082, Revision 6, "Westinghouse Setpoint Methodology for Protection Systems, Diablo Canyon Units 1 & 2, 24 Month Fuel Cycle Evaluation," for the SG water level-low low and SG water level-high high reactor trip setpoints. The licensee applied the steam flows corresponding to the loss of normal feedwater-single loop and small steamline break outside containment to determine the mid-deck plate ΔP and other ΔP effects.

At the staff's request, the licensee discussed the equation used to calculate the mid-deck plate ΔP. The equation shows that the mid-deck plate ΔP is a function of the total steam flow with an adjustable coefficient that is specific to the SG type and the mid-deck plate design at the DCPP. The licensee compared the calculated value with the plant data applicable to the DCPP and confirmed that the equation overpredicted the mid-deck plate ΔP. Therefore, the staff agrees with the licensee that the equation is reasonably accurate and conservative for predicting the mid-deck plate ΔP.

In addressing the effects of the transient conditions, the licensee identified the events that credited a particular SG level setpoint for consequence mitigation and determined the physical effect of the transient conditions with respect to each PMA term identified in the NSALs and the overall impact on the SG level setpoint uncertainty for those affected events. Further, the licensee evaluated the limiting event and the associated setpoint uncertainty to verify that each of the SG level setpoints established in WCAP-11082, Revision 6, maintained an acceptable allowable margin with respect to the effects of transient conditions.

3.1 SG Level-Low Low Setpoint

In the design basis analyses, the SG NR water level-low low trip was credited in the analysis of the loss of normal feedwater, small steam line break outside containment, and feedwater line break. For the SG level-low low setpoint determination, the licensee calculated the uncertainty effects for the following events: (1) loss of normal feedwater - all loops, (2) loss of normal feedwater - single loop, (3) small steamline break outside containment - mass and energy, (4) small/intermediate feedwater line break with no feedwater entering the affected SG, and (5) small/intermediate feedwater line break with some feedwater entering the affected SG. The SG level-low low setpoint would be calculated by subtracting the total channel uncertainty from the safety analysis limit (SAL). The proposed nominal SG level-low low setpoint of 15 percent is conservative with available margin and is, therefore, acceptable.

The TS allowable value (AV) is the limiting value that the trip setpoint can have when tested periodically, beyond which the instrument channel is declared inoperable and corrective action must be taken. The AVs are determined by adding (or subtracting toward a non-conservative direction) the allowance for (1) instrument calibration uncertainties, (2) instrument uncertainties during normal operation, and (3) instrument drift to the NTS. The licensee did not apply all of the terms allowed in "Method 3," resulting in conservative values. The methodology for calculating the AVs is described in WCAP-11082 dated January 1997. This methodology uses a rack drift (RD) uncertainty plus a rack measuring and test equipment (RMTE) uncertainty. The licensee calculated the allowance based on the addition of the RD and RMTE uncertainties. The proposed AV of 14.8 percent which was calculated by subtracting the allowance from NTS is acceptable, as this value provides a margin between the AV and SAL that exceeds the total channel uncertainty.

With the proposed SG nominal level-low low trip setpoint and AVs of 15 percent and 14.8 percent, respectively, to account for the PMA terms identified in the NSALs previously unaccounted for, the existing safety analysis using the SAL of 0.0 percent for the SG level-low low trip remains valid. This satisfies the GDC 20 requirements, which require the protection system be designed to trip the reactor to ensure that SAFDLs are not exceeded.

3.2 SG Level-High High Setpoint

The SG level-high high trip is used in the design basis analyses to terminate a feedwater malfunction or excessive feedwater flow event. NSAL-02-4 indicated that the void content of the two-phase mixture above the mid-deck plate was not reflected in the SG level setpoint calculations. This results in a premature actuation of the SG water level-high high trip signal that isolates the feedwater system. In addressing the NSAL-02-4 issue, the licensee calculated the total channel uncertainty including the effects of void content above the mid-deck plate. The trip setpoint is determined by the SAL plus or minus uncertainty depending on the direction of conservatism. Since the design basis analyses assumed that the reactor trip and the feedwater isolation signal occurred at 85 percent span, the SG level-high high trip setpoint would be calculated by subtracting the total channel uncertainty from the SAL of 85 percent. Therefore, the existing TS nominal level-high high trip setpoint of 75 percent is conservative with margin and remains valid. The methodology for calculating the AVs is described in WCAP-11082. This methodology uses a RD uncertainty plus an RMTE uncertainty. The licensee calculated the allowance based on the addition of the RD and RMTE uncertainties. Therefore, the existing TS AV of 75.2 percent (calculated by adding allowance to 75 percent NST) remains valid, as this value provides a margin between the AV and SAL that exceeds the total channel uncertainty.

3.3 Initial SG Water Inventory Assumed in the Design Basis Analysis

NSAL-02-5 identified potential inaccuracies in the initial water level assumed in the safety analyses affected by SG water level uncertainties. The safety analyses may not be bounding because under some conditions, the velocity head may increase the uncertainties in the SG water level control system.

In response to the staff's RAI, the licensee provided information to discuss how it addressed the NSAL-02-5 issue. The licensee indicated that the SG level control system for DCPP is programmed with a reference level of 44 percent span. The instrumentation uncertainties were included in modeling the initial SG water level for design basis analyses. The SG water level was assumed in the most conservative direction for each case. For example, in the loss of normal feedwater analysis, it is conservative to assume a high initial SG water level because it delays the time of reactor trip caused by a SG water-low low trip signal and results in the greatest peak pressurizer pressure. The licensee performed uncertainty calculations for the DCCP SGs and confirmed that the calculated values of SG level uncertainties were bounded by those assumed in the initial SG water level for the design basis analyses. Therefore, the staff agrees with the licensee that the uncertainties discussed in NSAL-02-5 do not adversely affect the current safety analyses.

3.4 SG Low-Low Level Setpoint (Anticipated Transient Without Scram [ATWS])

An ATWS event is defined as an anticipated operational occurrence combined with an assumed failure of the reactor trip system to shut down the reactor. For Westinghouse plants, the ATWS rule, 10 CFR 50.62, requires the installation of an ATWS mitigation system actuation circuitry (AMSAC) to initiate turbine trip and actuate AFW independent of the reactor protection system. The licensee has met the ATWS rule by installing an AMSAC. The AMSAC uses one SG NR water level signal from each loop with a setpoint of 5 percent of the SG NR span. The licensee indicated that actuation of the AMSAC system would have been delayed by the non-conservative effects identified in the NSALs, including the mid-deck plate ΔP. In addressing the non-conservative effects, the licensee increased the AMSAC setpoint from 5 percent to 11 percent. In response to the staff's request, the licensee submitted the results of calculations for the AMSAC setpoint with inclusion of uncertainties of the PMA terms identified in the NSALs. The results indicated that the revised AMSAC setpoint of 11 percent of the SG NR span adequately included the total channel uncertainty calculated for DCPP. Therefore, the staff determined that the revised AMSAC setpoint of 11 percent is conservative, and is acceptable.

3.5 Conclusion

The staff has reviewed the licensee's proposed changes to DCPP Units 1 and 2 TSs to increase the SG level-low low trip setpoint and allowable value to 15 percent and 14.8 percent, respectively. Based on the above evaluation, the staff concludes that the licensee appropriately addressed the issues specified in the NSALs and the proposed setpoint and allowable value are conservative and comply with the GDC 20 requirements. Therefore, the staff concludes that the licensee's proposed TS changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the California State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding (68 FR 66138). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: S. Sun
S. Rhow

Date: December 2, 2004